AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

Please cancel Claims 1-255.

256. (New) A method that constrains a DC level of an input word, comprising:

summing n symbols of components of said input word and generating a sum for each component;

comparing an absolute value of said sum to a threshold;

encoding said component into a substitute component if said absolute value of said sum for said component exceeds said threshold; and

one of combining said components having said sum with said absolute value that does not exceed said threshold with at least one substitute component into an output word and outputting said input word as said output word if at least one substitute component is not generated.

257. (New) The method of Claim 256 wherein said substitute component includes less than n symbols.

258. (New) The method of Claim 256 wherein said input word includes 32 symbols and said output word includes at least 33 symbols.

259. (New) The method of Claim 258 wherein said components include 8 symbols, said threshold is 4 and said substitute component includes 5 symbols.

260. (New) The method of Claim 256 further comprising:

selecting an output word template based on a number of substitute components and based on a position that said substitute components originally occupied in said input word;

inserting said substitute components in said output word based on said output word template; and

inserting said components that have said sum with said absolute value that does not exceed said threshold in said output word based on said output word template.

261. (New) The method of Claim 260 further comprising inserting address symbols in said output word based on said output word template.

262. (New) The method of Claim 260 further comprising inserting indicator symbols in said output word based on said output word template.

263. (New) The method of Claim 256 further comprising adding a parity symbol to said output word to make a product of symbols of said output word positive.

264. (New) The method of Claim 256 further comprising adding a parity symbol to said output word to make a product of symbols of said output word negative.

265. (New) The method of Claim 256 wherein said symbols are in an alphabet {1, -1} and wherein said output word has a sum between -17 and 17.

266. (New) The method of Claim 256 further comprising at least one of encoding said component into a substitute component if said symbols of said component alternate between a positive value and a negative value over said n symbols and encoding said component into a substitute component if said symbols of said component alternate between a negative value and a positive value over said n symbols.

267. (New) The method of Claim 256 wherein said output word is output to a perpendicular recorder in a data storage system.

268. (New) A DC-level constraining circuit that constrains a DC level of an input word, comprising:

summing means for summing n symbols of components of said input word and for generating a sum for each component;

comparing means for comparing an absolute value of said sum to a threshold;

encoding means for encoding said component into a substitute component if said absolute value of said sum for said component exceeds said threshold; and

combining means for one of combining said components having said sum with said absolute value that does not exceed said threshold with at least one substitute component into an output word and outputting said input word as said output word if at least one substitute component is not generated.

269. (New) The DC-level constraining circuit of Claim 268 wherein said substitute component includes less than n symbols.

270. (New) The DC-level constraining circuit of Claim 268 wherein said input word includes 32 symbols and said output word includes at least 33 symbols, said components include 8 symbols, said threshold is 4, and said substitute component includes 5 symbols.

271. (New) The DC-level constraining circuit of Claim 268 wherein said encoding means selects an output word template based on a number of substitute components and based on a position that said substitute components originally occupied in said input word.

272. (New) The DC-level constraining circuit of Claim 271 wherein said encoding means inserts said substitute components in said output word based on said output word template and inserts said components that have said sum with said absolute value that does not exceed said threshold in said output word based on said output word template.

273. (New) The DC-level constraining circuit of Claim 271 wherein said encoding means inserts address symbols in said output word based on said output word template.

274. (New) The DC-level constraining circuit of Claim 271 wherein said encoding means inserts indicator symbols in said output word based on said output word template.

275. (New) The DC-level constraining circuit of Claim 268 further comprising parity means for adding a parity symbol to said output word to make a product of symbols of said output word positive.

276. (New) The DC-level constraining circuit of Claim 268 further comprising parity means for adding a parity symbol to said output word to make a product of symbols of said output word negative.

277. (New) The DC-level constraining circuit of Claim 268 wherein said symbols are in an alphabet {1, -1}, and wherein said output word has a sum between -17 and 17.

278. (New) The DC-level constraining circuit of Claim 268 wherein said encoding means encodes said component into a substitute component if said symbols of said component alternate between a positive value and a negative value over said n symbols.

279. (New) The DC-level constraining circuit of Claim 268 wherein said encoding means encodes said component into a substitute component if said symbols of said component alternate between a negative value and a positive value over said n symbols.

280. The DC-level constraining circuit of Claim 268 wherein said DC-level constraining circuit is implemented in a perpendicular recorder of a data storage system.

281. (New) A DC-level constraining circuit that constrains a DC level of an input word, comprising:

a summer that sums n symbols of components of said input word and generates a sum for each component;

a comparator that compares an absolute value of said sum to a threshold; and

an encoder that encodes said component into a substitute component if said absolute value of said sum for said component exceeds said threshold and one of combines said components having said sum with said absolute value that does not exceed said threshold with at least one substitute component into an output word and outputs said input word as said output word if at least one substitute component is not generated.

282. (New) The DC-level constraining circuit of Claim 281 wherein said substitute component includes less than n symbols.

283. (New) The DC-level constraining circuit of Claim 281 wherein said input word includes 32 symbols and said output word includes at least 33 symbols, said components include 8 symbols, said threshold is 4, and said substitute component includes 5 symbols.

284. (New) The DC-level constraining circuit of Claim 281 wherein said encoder selects an output word template based on a number of substitute components and based on a position that said substitute components originally occupied in said input word.

285. (New) The DC-level constraining circuit of Claim 284 wherein said encoder inserts said substitute components in said output word based on said output word template and inserts said components that have said sum with said absolute value that does not exceed said threshold in said output word based on said output word template.

286. (New) The DC-level constraining circuit of Claim 284 wherein said encoder inserts address symbols in said output word based on said output word template.

287. (New) The DC-level constraining circuit of Claim 284 wherein said encoder inserts indicator symbols in said output word based on said output word template.

288. (New) The DC-level constraining circuit of claim 281 further comprising a parity coder that adds a parity symbol to said output word to make a product of symbols of said output word positive.

289. (New) The DC-level constraining circuit of Claim 281 further comprising a parity coder that adds a parity symbol to said output word to make a product of symbols of said output word negative.

290. (New) The DC-level constraining circuit of Claim 281 wherein said symbols are in an alphabet {1, -1}, and wherein said output word has a sum between -17 and 17.

291. (New) The DC-level constraining circuit of Claim 281 wherein said encoder encodes said component into a substitute component if said symbols of said component alternate between a positive value and a negative value over said n symbols, and wherein said encoder encodes said component into a substitute component if said symbols of said component alternate between a negative value and a positive value over said n symbols.

292. The DC-level constraining circuit of Claim 281 wherein said DC-level constraining circuit is implemented in a perpendicular recorder of a data storage system.